

EXPLANATION OF PLATE 31.

- Fig. 1. *Hymenochirus Boettgeri*, male. Hyobranchial, laryngeal, and mandibular skeleton, ventral view. ($\times 6$)
2. Laryngeal skeleton of same, dorsal view.
3. *Hymenochirus Boettgeri*, female. Laryngeal skeleton, and hinder part of hyobranchial skeleton, ventral view. ($\times 6$)
4. Laryngeal skeleton of same, dorsal view.
5. Carpal skeleton of same, dorsal view. ($\times 12$; see page 462.)

Reference Letters.

So far as has been possible, the lettering used in Plates 8 and 9, Linn. Soc. Journ., Zool., xxvi. 1897, has been adopted in the present instance.

- a.* Ala, or great wing of the hyobranchial skeleton.
- ar.* Arytenoid.
- as.* Angulosplenic bone.
- bl.* Dorsal extremity of vertical cricoid rod.
- br.* Bronchial cartilage.
- c.* Dorsal or roofing portion of the cricoid cartilage.
- c'.* Antero-ventral portion of cricoid.
- c''.* Postero-ventral portion of cricoid.
- ca.* Ossified copula (*cf.* 6. pl. 2. figs. 1 & 2, *ca*).
- ch.* Ceratohyal or hyoidean cornu.
- chl.* Median cartilage formed by the secondary union of the hyoidean cornua.
- d.* Dentary bone.
- ep.* Posterior epiphysis of the thyrohyal.
- ge.* Area of insertion of the m. geniohyoideus externus.
- gl.* Position of the glottis.
- h.* Hyoglossal foramen.
- i.* Isthmus between the anterior and posterior portions of the branchial skeleton.
- i'.* Ligament equivalent to the cartilaginous isthmus of the female.
- pa.* Anterior plate of the hyoidean skeleton (*cf.* 5. pl. 35. fig. 11, *pa*).
- pm.* Outline of anterior part of lung.
- t.* Thyrohyal bone.
- t'.* Lamella of cartilage projecting from the thyrohyal bone in the male.

Note on the Carpus of the new Aglossal Toad, *Hymenochirus Boettgeri*. By W. G. RIDEWOOD, D.Sc., F.L.S.

(PLATE 31. fig. 5.)

WHEREAS the carpus of *Xenopus* is comparatively normal, and does not differ in any very essential respect from that of *DiscoGLOSSUS* or *Bombinator*, the carpus of *Pipa* is remarkable from

the fact that the ulna is separated from the fifth metacarpal by a single bone, and not two bones as in all other Anurous Amphibians.

While investigating the hyobranchial skeleton of *Hymenochirus*, an account of which appears in the pages immediately preceding, it occurred to me that it would be of considerable interest to determine, while the material was still in my hands, whether the carpus of this new genus could throw any light upon the question of the affinities of this form with the two previously known Aglossal Toads.

An examination of the carpus of *Hymenochirus* disclosed the fact that in this genus, as in *Pipa*, a single bone intervenes between the ulna and the fifth metacarpal. In view of the great variation to which the carpus of the Anura is subject, it is perhaps unwise to attach much importance to this fact; but it is certainly remarkable that the *Hymenochirus* of Africa should thus depart from the generalized type of carpus found in *Xenopus* (African), and should approach the hitherto unique variety exemplified by the American *Pipa*.

The carpus of *Hymenochirus* (fig. 5, Pl. 31) consists of five elements, not including the radial sesamoid (*s*). This last occurs also in both *Pipa* and *Xenopus*. In a joint paper on the Anuran Carpus and Tarsus by Prof. G. B. Howes and myself, the ventral surface of the carpus of *Xenopus* and *Pipa* is unfortunately figured as the dorsal surface, and the radial sesamoid is stated as occurring ventrally to the lunatum *—mistakes which were pointed out by Jungersen † in 1891. The sesamoid in question is dorsal in position in all three genera, and is lenticular in shape. In *Hymenochirus* it occupies a more proximal position than in *Pipa* and *Xenopus*, and lies over the epiphysis of the radius,—a fact somewhat destructive to the theory put forward by Emery ‡ that this element, in *Pipa*, is an “intermedium carpi.” Since the dorsal radial sesamoid has been shown by Zwick § to occur also in the Frog and Toad, it cannot be regarded as distinctive of the Aglossa.

The largest bone of the carpus is that which extends from the ulna to the fifth metacarpal (*pk*). It represents the pyramidale

* Proc. Zool. Soc. Lond. 1888, pl. vii. figs. 1, 2 & 4, and p. 162.

† Ann. Mag. Nat. Hist. [6] viii. pp. 193-206.

‡ Ricerche Lab. Anat. Norm. Roma, iv. 1894, p. 10.

§ Zeitschr. für wiss. Zool. lxiii. 1898, p. 102.

or ulnare, confluent with the post-axial centrale, as in *Pipa*. The distal carpal of the fifth digit is probably absent and not included in this bone. The fourth carpal is free. Seen from above, it articulates with a part of the third metacarpal as well as the fourth, but an examination of the palmar surface of the carpus suffices to show that this element belongs exclusively to the fourth digit.

In *Pipa* the third carpal is free, while that of the second digit is (presumably) fused with the naviculare or pre-axial centrale, but there is no distinct carpal to either the second or third digit in *Hymenochirus*. Whether the carpals of these digits have dwindled away and left no traces, or whether they have fused with the naviculare, it is impossible to say. The appearances rather suggest that the latter is the more correct interpretation.

The lunatum (*l*) is normal, and calls for no comment.

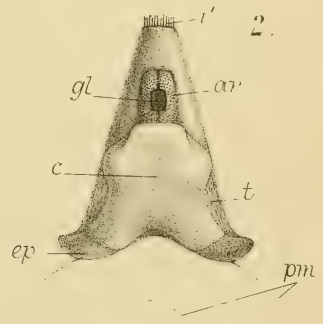
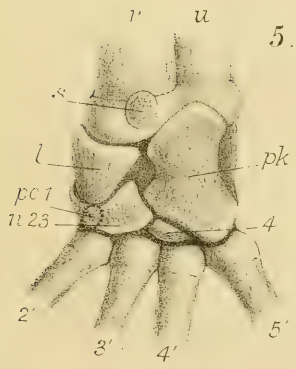
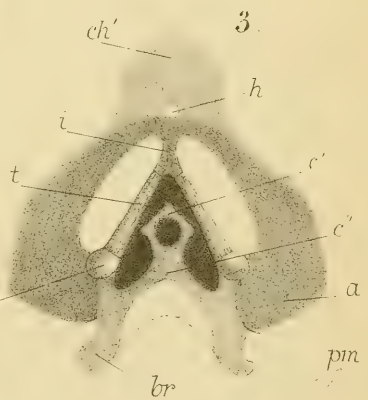
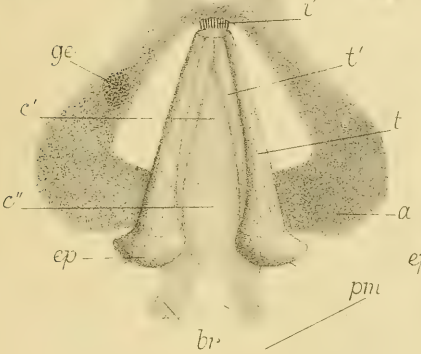
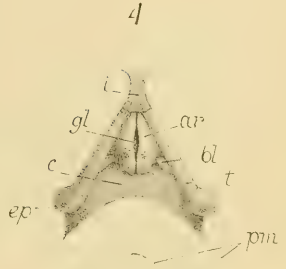
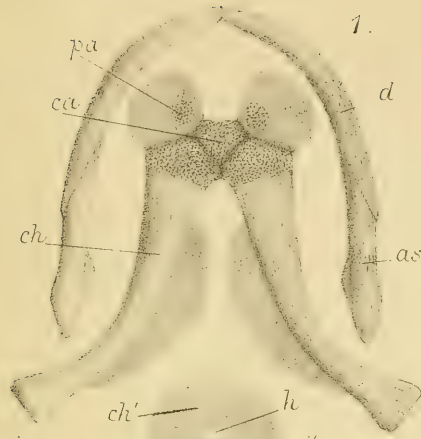
The pollex is represented by a single lenticular bone, probably carpal 1, which lies on the ventral surface of the naviculare. It is concealed by the latter in a dorsal view, but its position is indicated in the figure by a dotted line (*po*. 1).

The terminology used in this note is the same as that employed by Prof. Howes and myself in 1888. The arguments propounded by Perrin, Emery, and Zwick do not appear to be of sufficient weight to warrant the relinquishing of the opinions we then held as to the morphological value of the parts of the Anuran manus.

EXPLANATION OF FIG. 5, PLATE 31.

Carpal skeleton of *Hymenochirus Boettgeri*, dorsal view ($\times 12$).

- l*. Lunatum.
- n*. 2, 3. Naviculare confluent with the carpals of the second and third digits.
- pk*. Pyramidale confluent with the post-axial centrale.
- po*. 1. Carpal of the pollex.
- r*. Radius.
- s*. Radial sesamoid.
- u*. Ulna.
- 4. Carpal of the fourth digit.
- 2', 3', 4', 5'. Metacarpals of the second, third, fourth, and fifth digits.



HYMENOCHIRUS BOETTGERI.
Hyobranchial Skeleton and Carpus.